

2. Post-Closure Plan

2.1 Introduction

The post-closure plan outlined below is designed to allow for continued facility maintenance and monitoring as required by WAC.173-304-407(6), (7) and (8).

2.2 Post-Closure Maintenance

Periodic maintenance will be required to insure the integrity of the various environmental control systems. Reseeding and minor regrading of the top cap to repair erosion may be necessary until vegetative cover becomes completely established. Surface water ditches must be cleaned of debris, and sediment ponds dredged as necessary to maintain their design capacity. Leachate lines must be cleaned every 2 years to remove growths, and the leachate pumping station will require routine maintenance. The gas control/flaring system may require occasional servicing.

2.3 Post-Closure Monitoring

2.3.1 Groundwater Monitoring

The locations of the existing monitoring wells are shown on Sheet 1. As a condition of the variance, two additional wells will be installed downgradient of the landfill at locations specified by SWHD. Under the current sampling schedule, wells will be sampled quarterly for the parameters specified in WAC 173-304-490(2)(d)(i); however, the timing and breadth of sampling is being reviewed by SWHD and the Washington Department of Ecology. It is expected that monitoring will be reduced for wells 2 and 3, which appear to be in a cross-gradient position, and analysis for additional parameters will be required for some of the remaining wells. Groundwater surface elevations will be determined each time groundwater is sampled, and groundwater flow rate and direction in both the perched and Lower Troutdale aquifers will be determined at least annually. In addition, the underdrain discharge point below the lower sediment pond will be monitored on the same schedule as the wells until such time as a water quality discharge/disposal permit can be obtained. Samples will be sent to a certified laboratory that follows EPA-approved methods for the tests required. Circle "C" will determine, using a statistical method approved by the jurisdictional health department, whether a statistically significant increase for parameters or constituents at any monitoring well at the compliance point is detected, Circle "C" will proceed with the notification, resampling and corrective action required by WAC 173-304-490(2)(i) and (j), as specified in Section 6 of the Circle "C" Operations Plan. The cost of

an additional sample analyzed for VOCs, BNAs and dissolved metals has been included in the annual monitoring cost as a contingency. Sampling procedures are detailed in Appendix B of the Circle "C" Operations Plan.

2.3.2 Surface Water Monitoring

Surface water will be monitored at four sites: on McCormick Creek, 100 yards upstream of the southern border of the landfill property and on the north side of the La Center Road Culvert; in the lower sediment pond; and at the exit of the small surface runoff culvert below the underdrain discharge point, when this culvert is flowing. Sites will be sampled quarterly for the parameters listed in WAC 173-304-490(2)(d)(i).

2.3.3 Gas Monitoring

A network of gas monitoring probes will be installed prior to closure at the locations shown on Sheet 3. These probes will be used to determine the gas concentrations at the property boundary and demonstrate compliance with WAC 173-304-460(2)(b)(i)(B). Gas monitoring will be conducted semi-annually at these probes and at the following additional locations: the leachate manhole, the drainage culverts which enter and exit the pond south of the property (see Sheet 1), the Circle "C" office/shop, the trailer house north of the landfill near monitoring wells 4 and 5, and any new structures which may be constructed on the site to serve a new cell or other activities.

Sites will be monitored for explosive gases and oxygen levels using portable gas detection equipment such as a Gas-Tech Model 1939 OX or equivalent.

2.3.4 Leachate Monitoring

As a condition of Circle "C"'s wastewater discharge permit from the City of Vancouver, leachate is sampled on a monthly basis for pH and on a quarterly basis for chemical oxygen demand and "phenols", which include phenol, cresols, pentachlorophenol, 2,3,4,5-tetrachlorophenol and other phenols detectable by EPA Method 604. Method 604, 625, or approved equivalent must be used for analysis. Sampling frequency and parameters may be modified if an alternative treatment/disposal system is approved and instituted in the future.

2.4 Leachate Treatment/Disposal

After closure, leachate will continue to be hauled to the City of Vancouver Westside Treatment Plant for treatment and disposal under Permit 89-16. Contractual arrangements have set the price for hauling at \$0.05/gallon and the price for disposal at \$0.042/gallon. Based on the predictions of the HELP model for the closed landfill (included as Appendix A), it is estimated that approximately 270,000 gallons of leachate will be generated each year.

In addition, as a condition of the variance, the discharge from the underdrain system will continue to be collected and hauled to the treatment plant as well. The volume of this discharge is estimated to average approximately 1/2 gallon per minute or 262,800 gallons/year. Due to the relatively low levels of contamination detected in this discharge to date, Circle "C" expects to pursue an alternative, permitted means of disposal for this discharge (e.g. land application).

2.5 Post-Closure Cost Estimates, Financial Assurance and Projected Fund Withdrawal Intervals

Post-closure cost estimates are presented in Table 2. Table 3 presents a present worth analysis based on the closure and post-closure cost estimates. Costs include 20 years of post-closure activities plus an additional 10 years of monitoring the underdrain discharge.

Post-closure funds are held in a trust account with Security Pacific Bank at the Portland headquarters office. In addition to the funds presently in the account, Circle "C" currently deposits \$5.46 per yard of waste received to cover the costs of post-closure. The amount deposited per yard is based on the present worth of post-closure costs, the volumes of waste received in each month in 1989, and the number of months the landfill can remain open under the variance.

It is projected that funds will be withdrawn on an annual or other periodic basis with the approval of the health district and placed into an operating account to cover the projected post-closure costs for the next calendar period. Funds may also be withdrawn on an as-needed basis for non-periodic maintenance and repair. All withdrawals of funds from the post-closure trust account must be approved by SWHD.

2.6 Post-Closure Certification

When post-closure activities are complete, Circle "C" Corporation will certify completion of post-closure to SWHD. This certification will be signed by the owner/operator and a professional engineer registered in the state of Washington, and will state why post-closure activities are no longer necessary, as required by WAC 173-304-407(8)(b).

2.7 Deed Clause Changes, Land Use and Zoning Restrictions

Upon completion of closure, Circle "C" will cause a notice to be placed in the deed to the facility property, identifying the property as having been used as a landfill. Any restrictions on future use will be noted in the deed as required by SWHD.

JSC/PETROW ENGINEERING, INC.
 1ST ESTIMATE WORKSHEET

Company: Circle C Corporation
 Project: Circle C Landfill
 Task: Closure Construction Costs -- Existing Cell
 Date: 6/14/90

Item	Description	Units	Quantity	Unit Costs	Total Item Cost
0	Landfill Top Cap				
1.1	Gas Transfer Rock (12" layer)	CUYD	17400	\$2.00	\$34,800.00
1.2	Geotextile Fabric (8 oz.)	SQFT	451000	\$0.12	\$54,120.00
1.3	Compacted Clay Top Liner (24")	CUYD	33400	\$1.00	\$33,400.00
1.4	Compacted Top Soil (6")	CUYD	8700	\$1.25	\$10,875.00
1.5	Seeding and Fertilizer	Acre	10	\$800.00	\$8,000.00
0	Landfill Gas System				
2.1	Perf. PVC Collection Pipe (6")	LF	500	\$5.00	\$2,500.00
2.2	Perf. PVC Collection Pipe (4")	LF	1820	\$4.50	\$8,190.00
2.3	Gas Collection Rock (backfill)	CUYD	260	\$2.00	\$520.00
2.4	Gas Trench Geotextile Fabric	SQFT	17400	\$0.12	\$2,088.00
2.5	Gas Vent Riser w/Post	EA	6	\$40.00	\$240.00
2.6	Flare w/Pilot. Standpipe	EA	\$1.00	\$5,000.00	\$5,000.00
2.7	Flame Arrestor	EA	\$1.00	\$1,500.00	\$1,500.00
2.8	Solid PVC Pipe to Flare (8")	LF	\$420.00	\$6.00	\$2,520.00
2.9	Gas Structure-Concrete Pad, Fence	EA	\$1.00	\$3,000.00	\$3,000.00
0	Miscellaneous Items	LS	1	\$1,345.00	\$1,345.00
Subtotal Construction Costs					\$168,098.00
Contingencies (10%)					\$15,000.00
Washington State Sales Tax (7.8%)					\$13,111.64
QA/QC & Construction Management					\$26,000.00
Total Project Costs					\$222,209.64

Note: Costs of Monitoring Well Installation, Erosion Control and extension of leachate collection system are considered operational/variance compliance costs and are not included.

Cost estimate assumes closure construction by Circle "C" Corporation

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SS PETROW ENGINEERING, INC.
 07 ESTIMATE WORKSHEET

Company: Circle C Corporation
 Project: Circle C Landfill
 Task: Post Closure Maintenance/Monitoring
 Date: 6/14/90

Item	Description	Units	Quantity	Unit Costs	Total Item Cost
0	Monitoring Labor/Equipment				
1.1	Sampling Technician Labor	HRS	32	\$10.00	\$320.00
1.2	Sampling Equipment & Supplies	RUN	4	\$650.00	\$2,600.00
1.3	Annual Summary Report	EA	1	\$3,500.00	\$3,500.00
0	Water Sample Analysis				
2.1	Quarterly Well Samples	EA	28	\$290.00	\$8,120.00
2.2	Quarterly Surface Samples	EA	14	\$290.00	\$4,060.00
2.3	Quarterly Leachate Samples	EA	4	\$280.00	\$1,120.00
2.4	Annual Toxic Organic Sample	EA	1	\$685.00	\$685.00
0	Gas Sample Analysis				
3.1	Semi-Annual Gas Samples	EA	2	\$640.00	\$1,280.00
3.2	Annual Summary Report (included in 1.5 above)				\$0.00
3.3	RFEI Administrative costs	ALL	1	\$130.00	\$130.00
0	Leachate Treatment/Disposal				
4.1	Leachate Transport	GAL	270000	\$0.050	\$13,500.00
4.2	Leachate Treatment	GAL	270000	\$0.042	\$11,340.00
0	Landfill Post-Closure Maintenance				
5.1	Crawler Tractor Time	HRS	20	\$50.00	\$1,000.00
5.2	Grass Seed/Fertilizer	ALL	1	\$200.00	\$200.00
	Subtotal Post-Closure Costs				\$47,855.00
	Contingencies				\$965.00
	Annual Post-Closure Costs				\$48,820.00

Notes: Quarterly well samples includes six wells + underdrain
 Surface samples includes 3 sites + culvert below underdrain twice per year
 All water sampling performed by employees of landfill operator
 Sampling costs to be revised based on changes in sampling schedule by WDOE/SWHD

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TABLE 2

38 PETROW ENGINEERING, INC.
PRESENT WORTH CALCULATION WORKSHEET

Company: Circle C Corporation

Project: Circle C Landfill

Task: Closure/Post-Closure Costs -- Present Worth at 3% Spread
20 years of post-closure + 10 years monitoring underdrain

Date: 14 June 1990

Year	Capital Costs	Annual Post-Closure Costs	Inf. Index (4.5%)	Total Annual Costs	P. Worth Index (7.5%)	P. Worth Costs	Year
=====	=====	=====	=====	=====	=====	=====	=====
90	\$222.210	\$0	1.000	\$222.210	1.0000	\$222.210	0
91		\$48.820	1.045	\$51.017	0.9302	\$47.456	1
92		\$48.820	1.092	\$53.311	0.8653	\$46.130	2
93		\$48.820	1.141	\$55.704	0.8050	\$44.841	3
94		\$48.820	1.193	\$58.242	0.7488	\$43.612	4
95		\$48.820	1.246	\$60.830	0.6966	\$42.374	5
96		\$48.820	1.302	\$63.564	0.6480	\$41.189	6
97		\$48.820	1.361	\$66.444	0.6028	\$40.052	7
98		\$48.820	1.422	\$69.422	0.5607	\$38.925	8
99		\$48.820	1.486	\$72.547	0.5216	\$37.840	9
00		\$48.820	1.553	\$75.817	0.4852	\$36.787	10
01		\$48.820	1.623	\$79.235	0.4513	\$35.759	11
02		\$48.820	1.696	\$82.799	0.4199	\$34.767	12
03		\$48.820	1.772	\$86.509	0.3906	\$33.790	13
04		\$48.820	1.852	\$90.415	0.3633	\$32.848	14
05		\$48.820	1.935	\$94.467	0.3380	\$31.930	15
06		\$48.820	2.022	\$98.714	0.3144	\$31.036	16
07		\$48.820	2.113	\$103.157	0.2925	\$30.173	17
08		\$48.820	2.208	\$107.795	0.2720	\$29.320	18
09		\$48.820	2.308	\$112.677	0.2531	\$28.518	19
10		\$48.820	2.412	\$117.754	0.2354	\$27.719	20
11		\$1,805	2.520	\$4,549	0.2190	\$996	21
12		\$1,805	2.634	\$4,754	0.2037	\$968	22
13		\$1,805	2.752	\$4,967	0.1895	\$941	23
14		\$1,805	2.876	\$5,191	0.1763	\$915	24
15		\$1,805	3.005	\$5,424	0.1640	\$890	25
16		\$1,805	3.141	\$5,670	0.1525	\$865	26
17		\$1,805	3.282	\$5,924	0.1419	\$841	27
18		\$1,805	3.430	\$6,191	0.1320	\$817	28
19		\$1,805	3.584	\$6,469	0.1228	\$794	29
20		\$1,805	3.745	\$6,760	0.1142	\$772	30
Total Present Worth Costs						\$966.075	

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TABLE 3